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|---|---|
| GARCIA OTERO, EDUARDO | |
| ART UNIT | PAPER NUMBER |
| 2123 | 8 |

DATE MAILED: 11/14/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

PRE

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/520,259 | VAN BEMMEL, PETER P. | |
| | Examiner | Art Unit | |
| | Eduardo Garcia-Otero | 2123 | |

*-- The MAILING DATE of this communication appears on the cover sheet with th corresp ndence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *08 October 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-41* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-41* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

## DETAILED ACTION: Final Action

### *Introduction*

1. Title is: METHOD AND APPARATUS FOR MAPPING UNCERTAINTY AND GENERATING A MAP OR A CUBE BASED ON CONDITIONAL SIMULATION OF RANDOM VARIABLES.
2. First named inventor is: BEMMEL.
3. Claims 1-41 have been submitted, examined, and rejected.
4. This action is in response to Applicant's Amendment, received 10/8/03.
5. Acknowledgment is made of applicant's claim for priority to provisional application 60/135,904 filed 05/25/99.

### *Index of Prior Art*

6. **Jones** refers to US Patent 5,838,634.
7. **Matteucci** refers to US Patent 5,884,229.
8. **Tucker** refers to The Computer Science and Engineering Handbook, by Allen B. Tucker, CRC Press, ISBN: 0-8493-2909-4, 1996.
9. **Journel** refers to "Fundamentals of Geostatics in Five Lessons" by Journel, vol 8 AGU, 1989 (mentioned at Specification page 1).
10. **Hogg** refers to Probability and Statistical Inference" by Hogg et al., Third Edition 1988, ISBN 0-02-355810-5, page 613 Table IV The Normal Distribution. Also see Section 6.4 Confidence Intervals for Means page 348-356.
11. **Webber** refers to US Patent 6,081,577.

### *Definitions*

12. **McGraw-Hill Dictionary** refers to The McGraw-Hill Dictionary of Scientific and Technical Terms, Sixth Edition, by McGraw-Hill Companies, Inc., ISBN 0-07-042313-X, 2003.

    **Gaussian distribution**-"normal distribution".

    **normal distribution**-"A commonly occurring probability distribution that has the form... [equations] mean... variance. Also known as Gauss' error curve; Gaussian Distribution."

***Remarks***

13. Applicant has submitted: formal drawings, two documents requested by the Examiner ("Fundamentals of Geostatics in Five Lessons" by Journel, see Specification page 1, and requests "GSLIB Geostatistical Software Library and User's Guide" second edition" by Deutsch et al., see Specification page 1), and a substitute specification merely adding paragraph numbers. No amendments were made to the claims.

    A. CLAIM 1, JONES. Applicant asserts (Remarks page 16) that Jones does not disclose "time slices". Note that claim 1 preamble states "generating a map illustrating a set of characteristics of a cross section through an earth formation representing a time slice or a horizon". Emphasis added. Thus, first, "time slices" are not mandatory, because the claim 1 limitation is "time slice or horizon". Additionally, second, the term "time slice" in is a term of art in the geological field where properties of underground media are determined by reflected sound waves (often generated by surface explosions). Time is proportional to the distance that the wave has traveled, and thus is proportional to depth. Thus, the term "time slice" in this context also appears to be referring to a horizontal cross section at a given depth. See Jones Column 2 line 10 "structural surfaces or horizons in the form of 2-D computer grids or meshes". Also see Matteucci FIG 1 which displays "time" as the vertical axis.

14. CLAIM 1, MATTEUCCI. Applicant asserts (Remarks page 17) that Matteucci is "using the cumulative distribution functions to measure the similarity of two vertical seismic traces, not investigating similarity of points along a grid on a cross section through the formation". Again, the exact claim language is critical, claim 1 states "obtaining a unique cumulative distribution function associated with each intersection of the grid of the gridded cross section thereby producing a plurality of cumulative distribution functions associated, respectively, with the plurality of intersections of said grid". Thus, the claim's cumulative distribution function does not appear to be "investigating similarity of points along a grid", rather each distribution function appears "respectively" to be associated with a single intersection point. This claim language is quite broad, and Matteucci does appear to disclose it.

15. CLAIM 1, TUCKER. Applicant asserts (Remarks page 18) that Tucker does not disclose the use of color "assigned to value taken from the cumulative distribution function of an

intersection on the grid of the cross section". However, Tucker does disclose the use of color for a "slice" of 3-D model, and does disclose the related claim 1 limitation in the context of Jones and Matteucci. Note that Tucker's use of color coded 3-D slices is widely used in many fields, including CAT scans (computerized aided tomography) and MRI (magnetic resonance imaging) and meteorology. Tucker discloses substantial detail regarding the usefulness of color coding due to preattentive processing, and even presents a "slice" of a 3-D dataset that appears to represent a cloud.

B. CLAIM 2. Applicant asserts that the additional limitations of claim 2 are distinguishable from the prior art, for the same reasons discussed in claim 1. No new issues are raised.

16. C-R. CLAIMS 3-41. No new issues are raised by Applicant.

**17. Applicant repeatedly emphasizes the Claim 1 term "each intersection of the grid of the gridded cross section". The Examiner does not find this term patentably distinct from Jones Column 2 line 10 "structural surfaces or horizons in the form of 2-D computer grids or meshes", particularly in the context of Matteucci FIG 1.**

18. The claim rejections are maintained without change, and repeated below for convenience.

***Claim Rejections - 35 USC § 103***

19. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action: (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.
20. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:
21. Determining the scope and contents of the prior art.
22. Ascertaining the differences between the prior art and the claims at issue.
23. Resolving the level of ordinary skill in the pertinent art.
24. Considering objective evidence present in the application indicating obviousness or nonobviousness.
25. **Claims 1-41 are rejected under 35 U.S.C. 103(a) as being unpatentable.**
26. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jones in view of Matteucci and Tucker.
27. Claim 1 is an independent "method of generating a map... cross section" claim with 4 limitations.

28. (a)-**gridded cross section** is disclosed by Jones at Column 1 line 49 "three-dimensional array of individual model units or blocks (also called cells)". Note that a "cross section" is a subset of a three-dimensional array. Also see Jones Column 2 line 10 "structural surfaces or horizons in the form of 2-D computer grids or meshes".
29. Jones does not explicitly disclose the remaining limitations.
30. (b)-**cumulative distribution function** is disclosed by Matteucci at Column 7 line 1 "cumulative distribution function".
31. (c)-**choosing a value from each of the cumulative distribution function** is disclosed by Matteucci at Column 7 line 1 "cumulative distribution function".
32. (d)-**assigning a unique color to said each value** is disclosed by Tucker at Plate 35.8. Said plate is in color, although the Applicant and the file will be provided only a black and white copy. The bar on the right labeled 0 to 12 displays a range of colors corresponding to different values, and the cutting plane at the center of the plate displays these colors. Each value has a unique color. Also see Tucker page 1520 "Preattentive processing is done for color... very useful if the rapid search for information is desired".
33. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Matteucci and Tucker to modify Jones because cumulative distribution functions are the classic way to generate probabilities with confidence intervals, and because color coding of the information is useful for rapid searching by preattentive processing.
34. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jones in view of Matteucci and Tucker and Journel.
35. Claim 2 depends from Claim 1, with three additional limitations.
36. Jones does not explicitly disclose the remaining limitations.
37. (b1)-**Kriging... expected values... standard deviations** is disclosed by Journal as discussed by Applicant at Specification Page 12 line 13 "The "Kriging" estimate is also known as the 'expected value'", and at Specification Page 12 line 17 "standard deviation".
38. (b2)-**probability density function** is disclosed by Journal as discussed by Applicant at Specification Page 12 line 22 "Gaussian". Note that Gaussian distribution means normal distribution, and that these distributions commonly occur in nature.

39. (b3)-**cumulative distribution function** is disclosed by Matteucci at Column 7 line 1 "cumulative distribution function".
40. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Matteucci and Tucker and Journal to modify Jones because cumulative distribution functions are the classic way to generate probabilities with confidence intervals, and because color coding of the information is useful for rapid searching by preattentive processing. Further, one of ordinary skill in the art would use Kriging to generate Gaussian probability density functions because Kriging is the standard way of generating data for unknown cells based on known data from few cells, and would use Gaussian functions because they are well known and well behaved functions that are frequently found in stochastic systems.
41. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable Jones in view of Matteucci and Tucker and Journel and Hogg.
42. Claim 3 depends from Claim 2, with 1 additional limitation.
43. Jones does not explicitly disclose the remaining limitations.
44. (c1)-**choosing a probability "(1-Pcu)" from each of the cumulative distribution functions** is disclosed by Hogg at page 613 Table IV The Normal Distribution. Also see Section 6.4 Confidence Intervals for Means page 348-356.
45. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Matteucci and Tucker and Journal and Hogg to modify Jones because cumulative distribution functions are the classic way to generate probabilities with confidence intervals, and because color coding of the information is useful for rapid searching by preattentive processing. Further, one of ordinary skill in the art would use Kriging to generate Gaussian probability density functions because Kriging is the standard way of generating data for unknown cells based on known data from few cells, and would use Gaussian functions because they are well known and well behaved functions that are frequently found in stochastic systems.
46. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable Jones in view of Matteucci and Tucker and Journel and Hogg.
47. Claim 4 depends from Claim 2, with 1 additional limitation.

48. Jones does not explicitly disclose the remaining limitations.
49. (c1)-**choosing a cutoff "Xp" from each of the cumulative distribution functions** is disclosed by Hogg at page 613 Table IV The Normal Distribution. Also see Section 6.4 Confidence Intervals for Means page 348-356.
50. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Matteucci and Tucker and Journal and Hogg to modify Jones because cumulative distribution functions are the classic way to generate probabilities with confidence intervals, and because color coding of the information is useful for rapid searching by preattentive processing. Further, one of ordinary skill in the art would use Kriging to generate Gaussian probability density functions because Kriging is the standard way of generating data for unknown cells based on known data from few cells, and would use Gaussian functions because they are well known and well behaved functions that are frequently found in stochastic systems.
51. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable Jones in view of Matteucci and Tucker and Journel and Hogg.
52. Claim 5 depends from Claim 2, with 1 additional limitation.
53. Jones does not explicitly disclose the remaining limitations.
54. (c1)-**choosing a lower limit from each of the cumulative distribution functions** is disclosed by Hogg at page 613 Table IV The Normal Distribution. Also see Section 6.4 Confidence Intervals for Means page 348-356.
55. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Matteucci and Tucker and Journal and Hogg to modify Jones because cumulative distribution functions are the classic way to generate probabilities with confidence intervals, and because color coding of the information is useful for rapid searching by preattentive processing. Further, one of ordinary skill in the art would use Kriging to generate Gaussian probability density functions because Kriging is the standard way of generating data for unknown cells based on known data from few cells, and would use Gaussian functions because they are well known and well behaved functions that are frequently found in stochastic systems.

**56.** Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable Jones in view of Matteucci and Tucker and Journel and Hogg.

57. Claim 6 depends from Claim 2, with 1 additional limitation.

58. Jones does not explicitly disclose the remaining limitations.

59. (c1)-**choosing a upper limit from each of the cumulative distribution functions** is disclosed by Hogg at page 613 Table IV The Normal Distribution. Also see Section 6.4 Confidence Intervals for Means page 348-356.

60. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Matteucci and Tucker and Journal and Hogg to modify Jones because cumulative distribution functions are the classic way to generate probabilities with confidence intervals, and because color coding of the information is useful for rapid searching by preattentive processing. Further, one of ordinary skill in the art would use Kriging to generate Gaussian probability density functions because Kriging is the standard way of generating data for unknown cells based on known data from few cells, and would use Gaussian functions because they are well known and well behaved functions that are frequently found in stochastic systems.

**61.** Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable Jones in view of Matteucci and Tucker and Journel and Hogg.

62. Claim 7 depends from Claim 2, with 1 additional limitation.

63. Jones does not explicitly disclose the remaining limitations.

64. (c1)-**choosing a spread from each of the cumulative distribution functions** is disclosed by Hogg at page 613 Table IV The Normal Distribution. Also see Section 6.4 Confidence Intervals for Means page 348-356.

65. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Matteucci and Tucker and Journal and Hogg to modify Jones because cumulative distribution functions are the classic way to generate probabilities with confidence intervals, and because color coding of the information is useful for rapid searching by preattentive processing. Further, one of ordinary skill in the art would use Kriging to generate Gaussian probability density functions because Kriging is the standard way of generating data for unknown cells based on known data from few cells, and would

use Gaussian functions because they are well known and well behaved functions that are frequently found in stochastic systems.

**66.** Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable Jones in view of Matteucci and Tucker and Journel and Webber.

67. Claim 8 depends from Claim 2, with 1 additional limitation.

68. Jones does not explicitly disclose the remaining limitations.

69. (c1)-**affine correction** is disclosed by Webber at Column 21 line 29 "affine correction".

70. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Matteucci and Tucker and Journal and Weber to modify Jones because cumulative distribution functions are the classic way to generate probabilities with confidence intervals, and because color coding of the information is useful for rapid searching by preattentive processing. Further, one of ordinary skill in the art would use Kriging to generate Gaussian probability density functions because Kriging is the standard way of generating data for unknown cells based on known data from few cells, and would use Gaussian functions because they are well known and well behaved functions that are frequently found in stochastic systems. Additionally, one of ordinary skill would use affine correction to "counteract" undesired effects according to Webber Column 21 line 16.

**71.** Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable Jones in view of Matteucci and Tucker and Journel and Webber.

72. Claim 9 depends from Claim 8, with 1 additional limitation.

73. Jones does not explicitly disclose the remaining limitations.

74. **assigning said unique color to each said corrected value** is disclosed by Tucker at Plate 35.8. Said plate is in color, although the Applicant and the file will be provided only a black and white copy. The bar on the right labeled 0 to 12 displays a range of colors corresponding to different values, and the cutting plane at the center of the plate displays these colors. Each value has a unique color. Also see Tucker page 1520 "Preattentive processing is done for color... very useful if the rapid search for information is desired".

75. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Matteucci and Tucker and Journal and Weber to modify Jones because cumulative distribution functions are the classic way to generate probabilities with

confidence intervals, and because color coding of the information is useful for rapid searching by preattentive processing. Further, one of ordinary skill in the art would use Kriging to generate Gaussian probability density functions because Kriging is the standard way of generating data for unknown cells based on known data from few cells, and would use Gaussian functions because they are well known and well behaved functions that are frequently found in stochastic systems. Additionally, one of ordinary skill would use affine correction to "counteract" undesired effects according to Webber Column 21 line 16.

76. Claims 10-14 are rejected under 35 U.S.C. 103(a) as being unpatentable
77. Claims 10-14 contain the same additional limitations as Claims 3-7, and therefore are rejected for the same reasons.
78. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jones in view of Matteucci and Tucker.
79. Claim 15 is an independent "**program storage device... cross section**" claim, with the same limitations as "method... cross section" Claim 1.
80. Therefore Claim 15 is rejected for the same reasons as Claim 1.
81. Claims 16-24 are rejected under 35 U.S.C. 103(a) as being unpatentable
82. Claims 16-24 depend from **"program storage device... cross section"** Claim 15, and contain the same additional limitations as Claims 2-14, and therefore are rejected for the same reasons.
83. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jones in view of Matteucci and Tucker.
84. Claim 25 is an independent "**apparatus... cross section**" claim, with the same limitations as "method... cross section" Claim 1.
85. Therefore Claim 15 is rejected for the same reasons as Claim 1.
86. Claims 26-29 are rejected under 35 U.S.C. 103(a) as being unpatentable
87. Claims 26-29 depend from "**apparatus... cross section**" Claim 25, and contain the same additional limitations as Claims 2-14, and therefore are rejected for the same reasons.
88. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jones in view of Matteucci and Tucker.

89. Claim 30 is an independent "**method... cube**" claim, and is rejected for the same reasons as Claim 1 "method... cross section". Note that the rejection used in Claim 1 applies to three dimensional cubes as well as two dimensional cross sections: is disclosed by Jones at Column 1 line 49 "three-dimensional array of individual model units or blocks (also called cells)". Note that a "cross section" is a subset of a three-dimensional array. Also see Jones Column 2 line 10 "structural surfaces or horizons in the form of 2-D computer grids or meshes".
90. Claims 31-35 are rejected under 35 U.S.C. 103(a) as being unpatentable
91. Claims 31-35 depend from **"method... cube"** Claim 30, and contain the same additional limitations as Claims 2-14, and therefore are rejected for the same reasons.
92. Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jones in view of Matteucci and Tucker.
93. Claim 36 is an independent **"program storage device... cube"** with the same limitations as "method... cross section" Claim 1, and therefore is rejected for the same reasons. Again, note that the Jones prior art applies to both cubes and cross sections.
94. Claims 37-41 are rejected under 35 U.S.C. 103(a) as being unpatentable
95. Claims 37-41 depend from **"program storage device... cube"** Claim 36, with the same additional limitations as Claims 2-14, and therefore are rejected for the same reasons. Again, note that the Jones prior art applies to both cubes and cross sections.

***Conclusion***

96. All claims stand rejected against prior art.

**FINAL OFFICE ACTION**

97. THIS ACTION IS MADE FINAL. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a). A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be

calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

***Communication***

98. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eduardo Garcia-Otero whose telephone number is 703-305-0857. The examiner can normally be reached on Monday through Thursday from 9:00 AM to 7:00 PM. If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Kevin Teska, can be reached at (703) 305-9704. The fax phone number for this group is 703-872-9306. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the group receptionist, whose telephone number is (703) 305-3900.

* * * *